

## The Delphi method online: Medical expert consensus via the Internet

**Kenneth M. Cam, BA, BS<sup>1</sup>, Patrick E. McKnight, PhD<sup>2</sup>, Jason N. Doctor, PhD<sup>1,3</sup>**

<sup>1</sup>School of Medicine, Univ. of Washington, <sup>2</sup>Department of Psychology, Univ. of Arizona

## Abstract


**Abstract:** *Delphi is an expert consensus method. The theory behind the Delphi method is that the interaction of experts may lead to a reduction in individual bias. We have developed software that carries out all aspects of the Delphi method via the Internet. The Delphi method online consists of three components: 1) authorship, 2) interactive polling, and 3) reporting/results. We hope that researchers use this tool in future medical expert systems.*

**Background:** Many of the data inputs used in clinical decision support algorithms rely on the opinions of experts. The Delphi Method was developed at the Rand Corporation as a semi-structured interactive and iterative polling strategy to obtain expert estimates of both risk and outcomes associated with different courses of action<sup>1</sup>. Medical decision research commonly applies the Delphi approach<sup>2</sup>, but the high cost in time & effort has impeded efforts to create & poll *in vivo* experts.

**Methods:** The Delphi method online consists of three components: 1) authorship, 2) interactive polling, and 3) reporting/results. These components utilize a collection of integrated open source tools: LAMP (Linux, Apache, MySQL, and PHP) plus R.

With the authorship component, a decision analyst can identify a set of medical experts and compose a set of questions for them using a web interface. The author can upload sound, pictures, or movies to help the experts form their opinions. The author sets convergence criteria for each set of questions.

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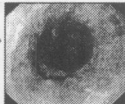

  
 Define Method

### SURVEY

Question

1. Mr. Jones is a 35-year-old male, with what percentage of the population will share the same life expectancy? The figure below shows the life expectancy of the population greater than 1 day a week for the past 10 years. He has not been treated for any chronic illness in the past 10 years.

How likely is it that Mr. Jones will get esophageal cancer within the next 10 years?



Answer

1. Please choose from one of the following

☐ 1% to 10%     
 ☐ 1% to 100%     
 ☐ 1% to 100,000%     
 ☐ 1% to 100,000,000%     
 ☐ 1% to 100,000,000,000%

My best estimate of the probability is:

*Figure 1 This is a sample question for the likelihood of Barrett's esophagus leading to cancer. The endoscopy result provides a visual media aid.*

In the interactive polling phase, experts are called to participate in a Delphi panel's first round via automated email. Experts are asked to access a URL for the project and complete the web-based forms containing the expert questions. A consistency algorithm determines how well their opinions converge. Provided the pre-specified convergence criterion has not been met, the results of the round are fed back to the experts and the process is repeated until convergence is met or N rounds have been completed.

When polling is complete, results are reported to the author in the form of a graphical report. The report details statistics about the number of rounds to convergence, the level of consensus and the distribution of estimates. The author can then use this information in a decision model for clinical decision support purposes.

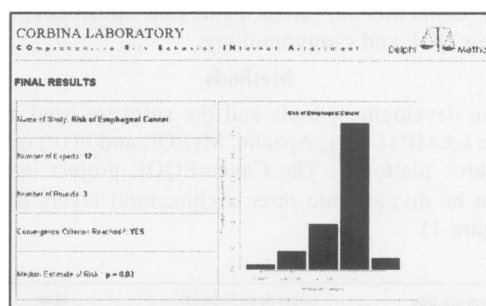


Figure 2 This shows a report produced for the author of the Delphi protocol on the convergence of Question 1. The graph shows the distribution of responses.

**Results:** To prevent rater fatigue and time burden, our final software design limits the number of questions asked of medical experts to five. In addition, the convergence algorithm operates on discrete data for computational efficiency. However, continuous data are allowed and can be used to obtain consensus estimates after convergence has been reached. We hope that researchers use this tool in future medical expert systems.

## References

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- <sup>2</sup> Schoenbaum, SC, McNeil BJ, Kaver, J: The swine influenza decision. *N Engl J Med* 295: 759-765, 1976.